

APPLICATION NO. 09/826,117

INVENTION: Hybrid Complex Walsh Codes for CDMA

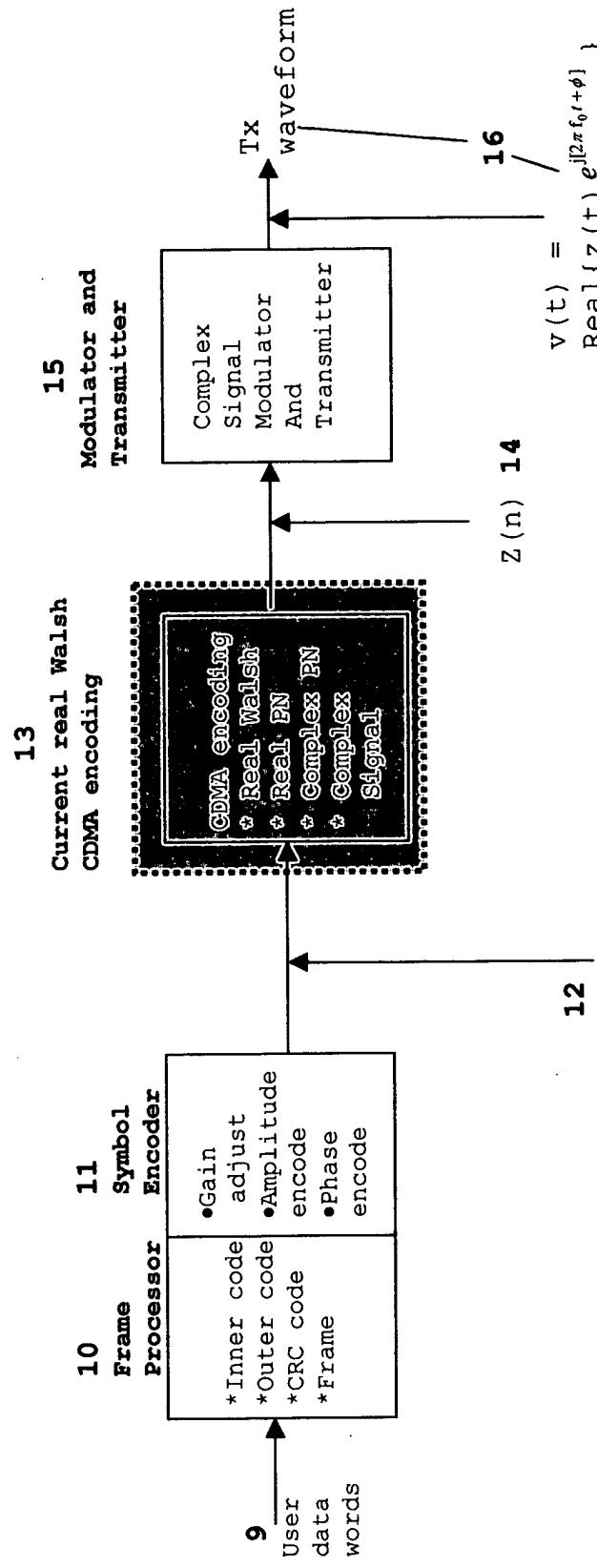
INVENTOR: Urbain A. von der Embse

DRAWINGS AND PERFORMANCE DATA

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**FIG. 1 CDMA Transmitter: Block Diagram**



User data symbols

$$= \{Z(u)\} = R(u_R) + jI(u_I)$$

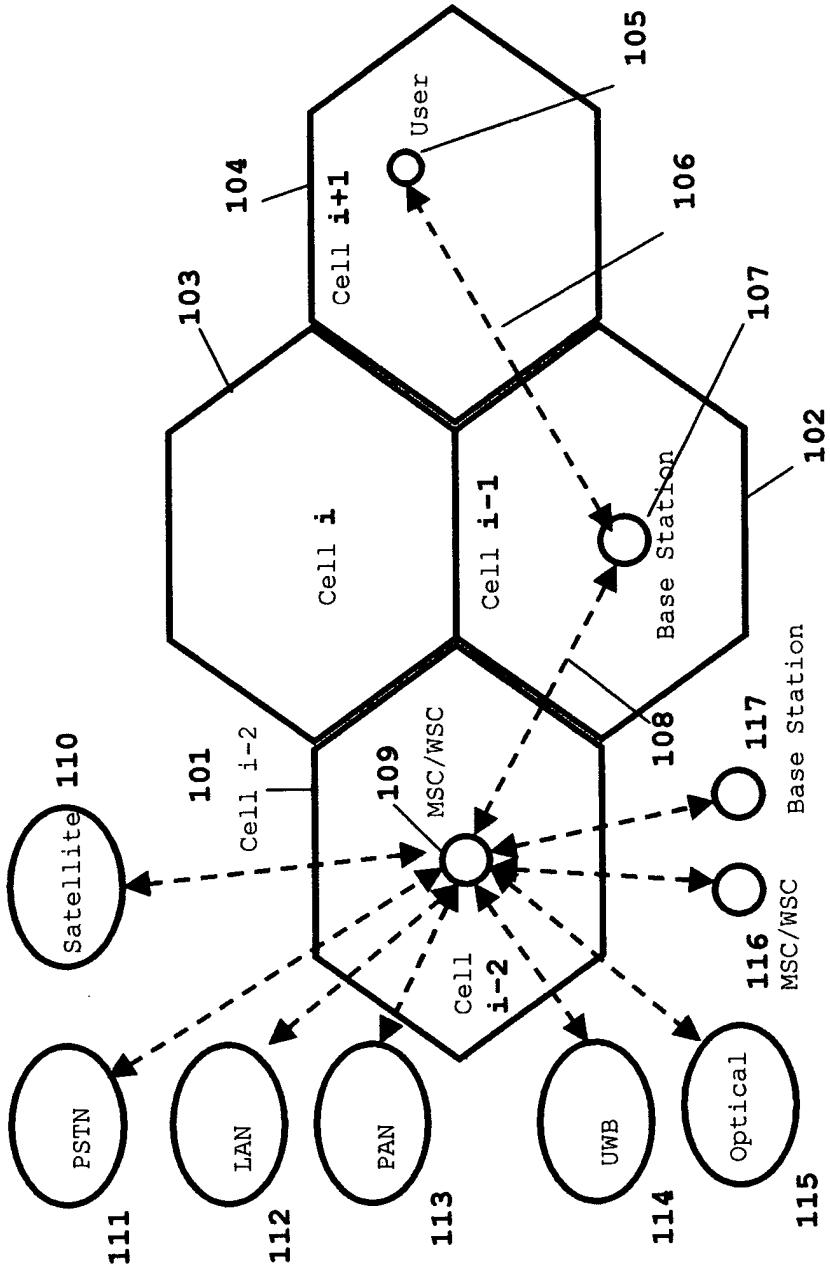
For complex data symbols  $u = u_R = u_I$

For real data symbols  $u = \text{index}$  for  
counting the user pairs  $(u_R, u_I)$

$$V(t) = \frac{1}{\text{Real}\{Z(t)\} e^{j[2\pi f_0 t + \phi]}}$$

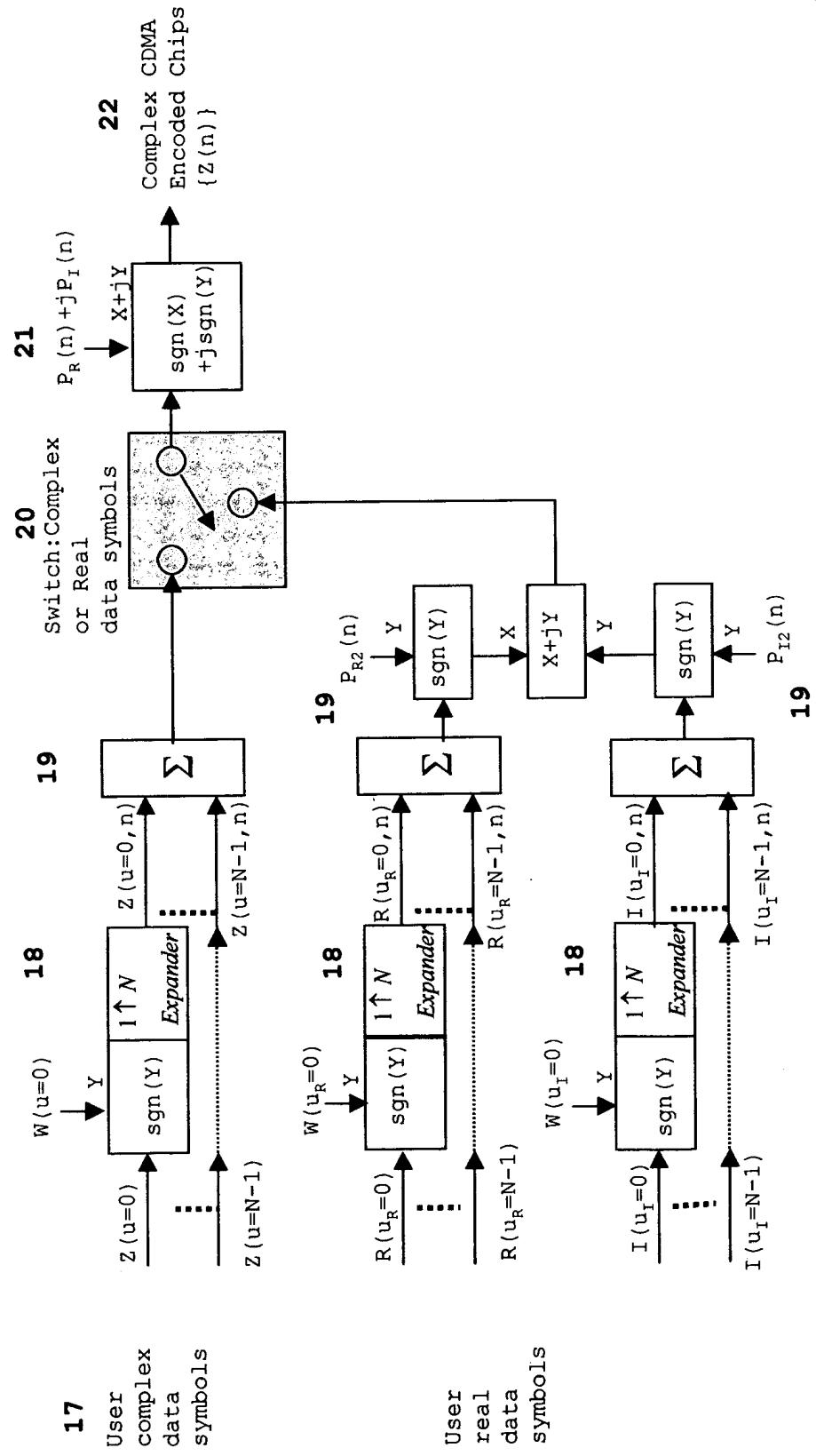
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**FIG. 1 CDMA Transmitter: Cellular Application**



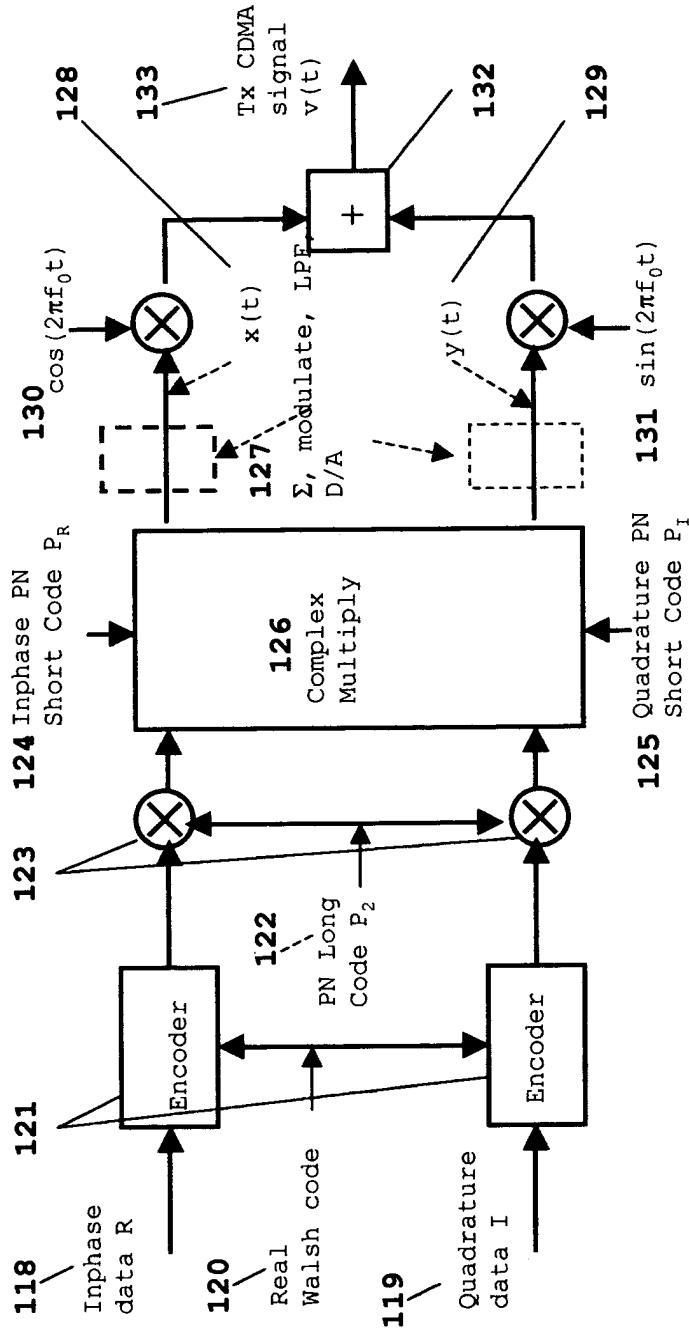
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**FIG. 2 Real Walsh CDMA Encoding**



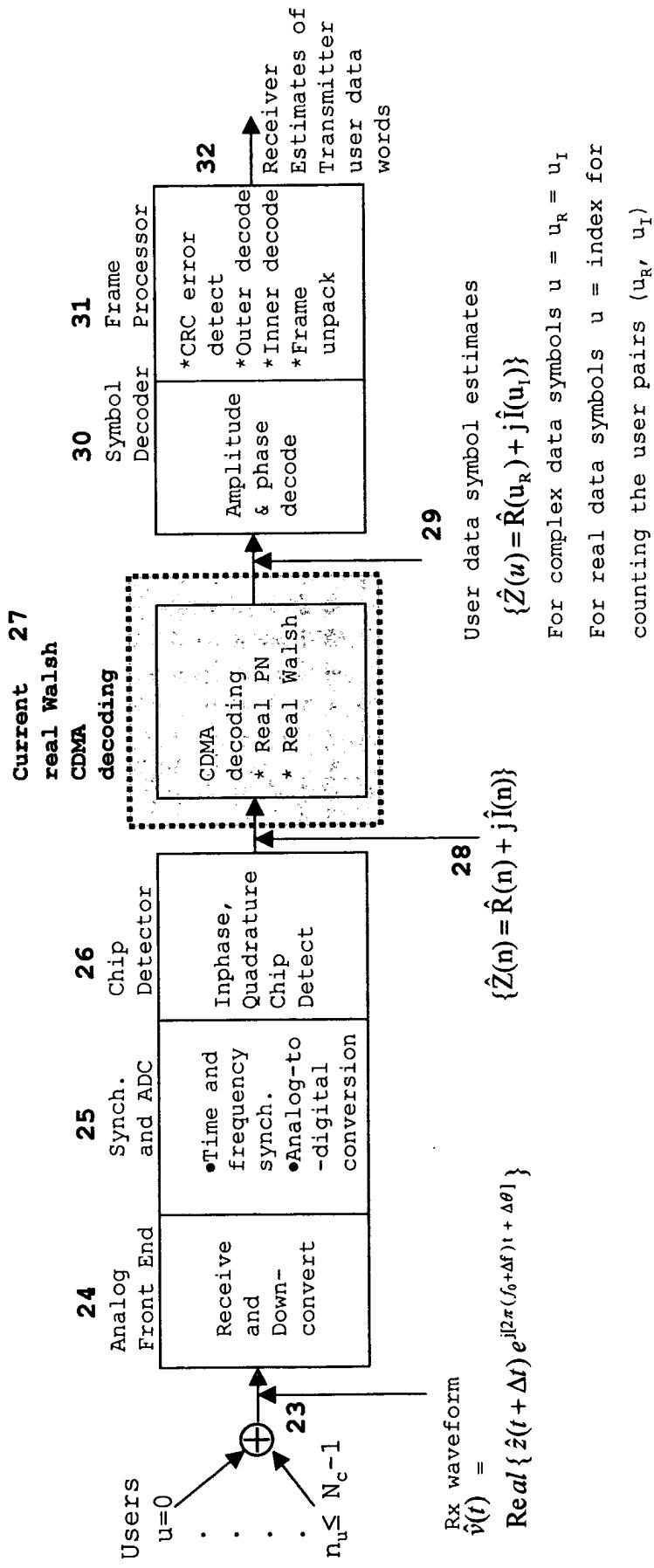
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**FIG. 2 CDMA Transmit Signal Processing**



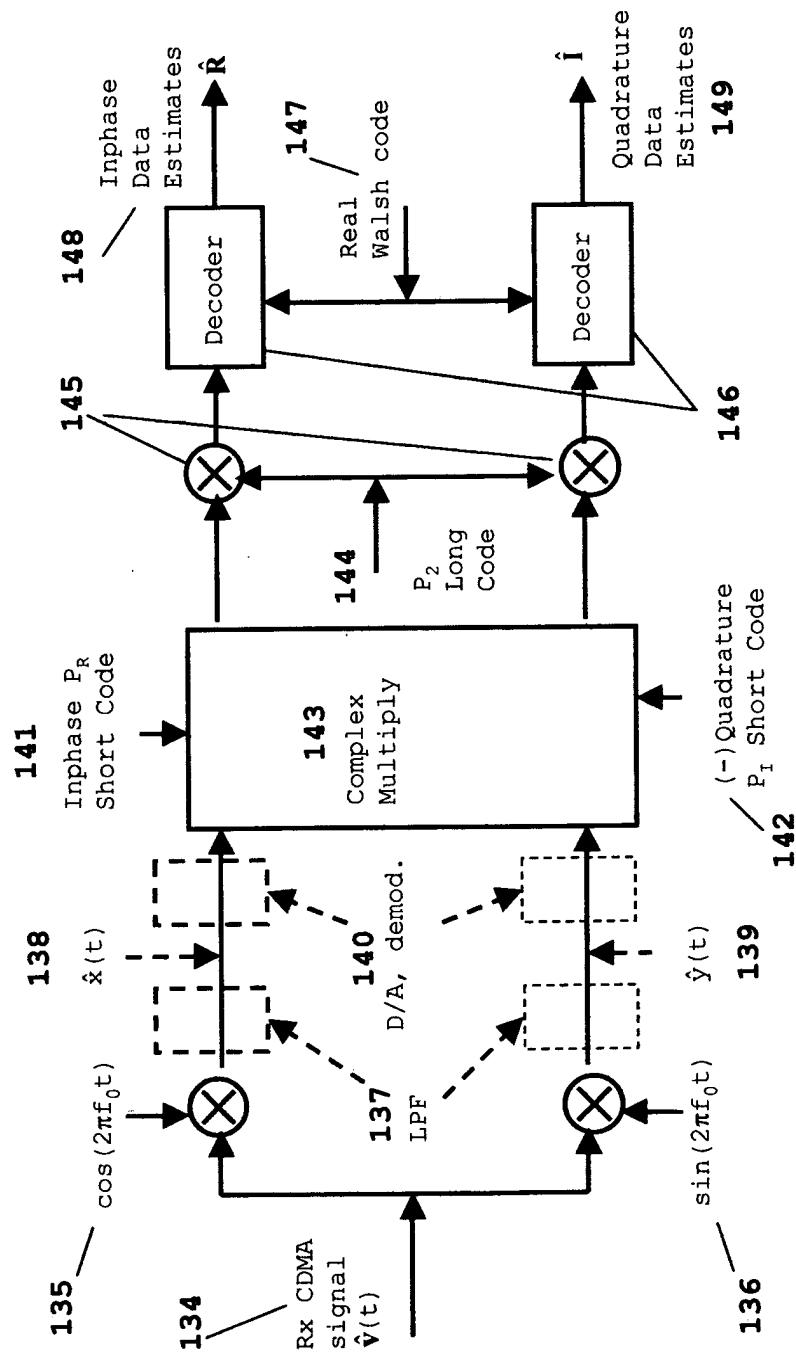
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**FIG. 3 CDMA Receiver Block Diagram**



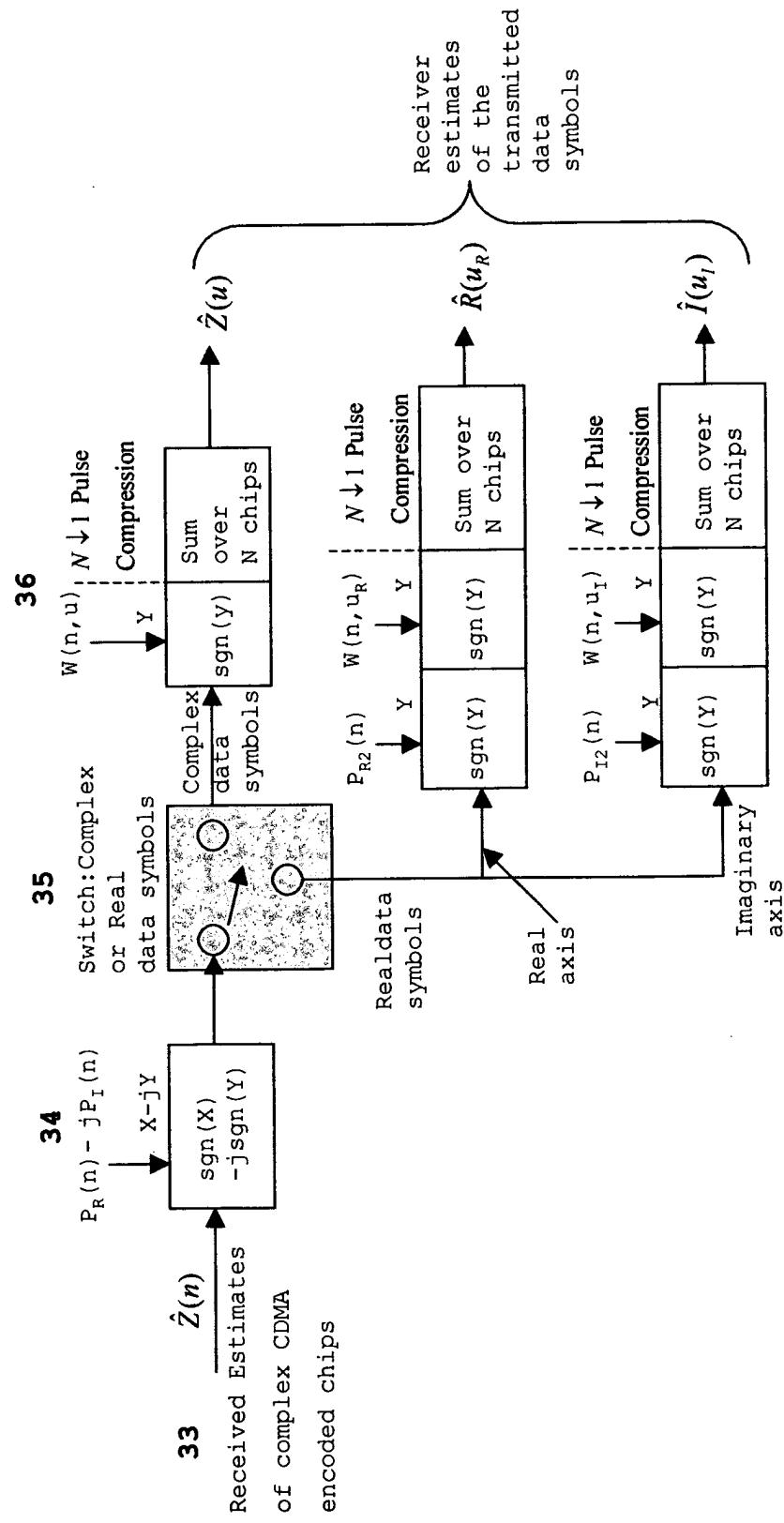
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**FIG. 3 CDMA Receive Signal Processing**



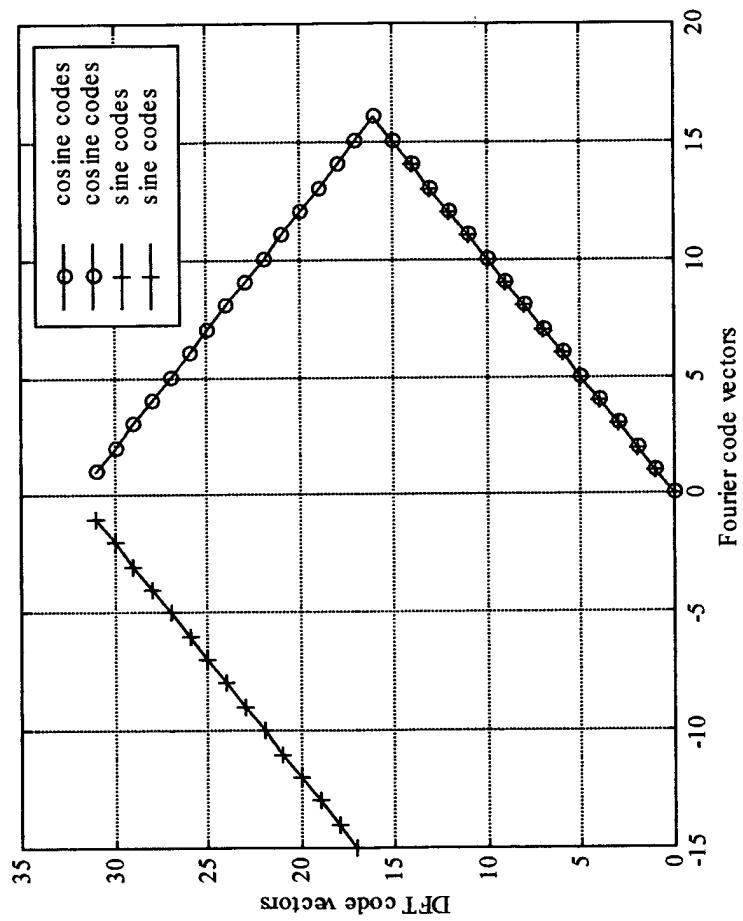
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**FIG. 4 Real Walsh CDMA Decoding**



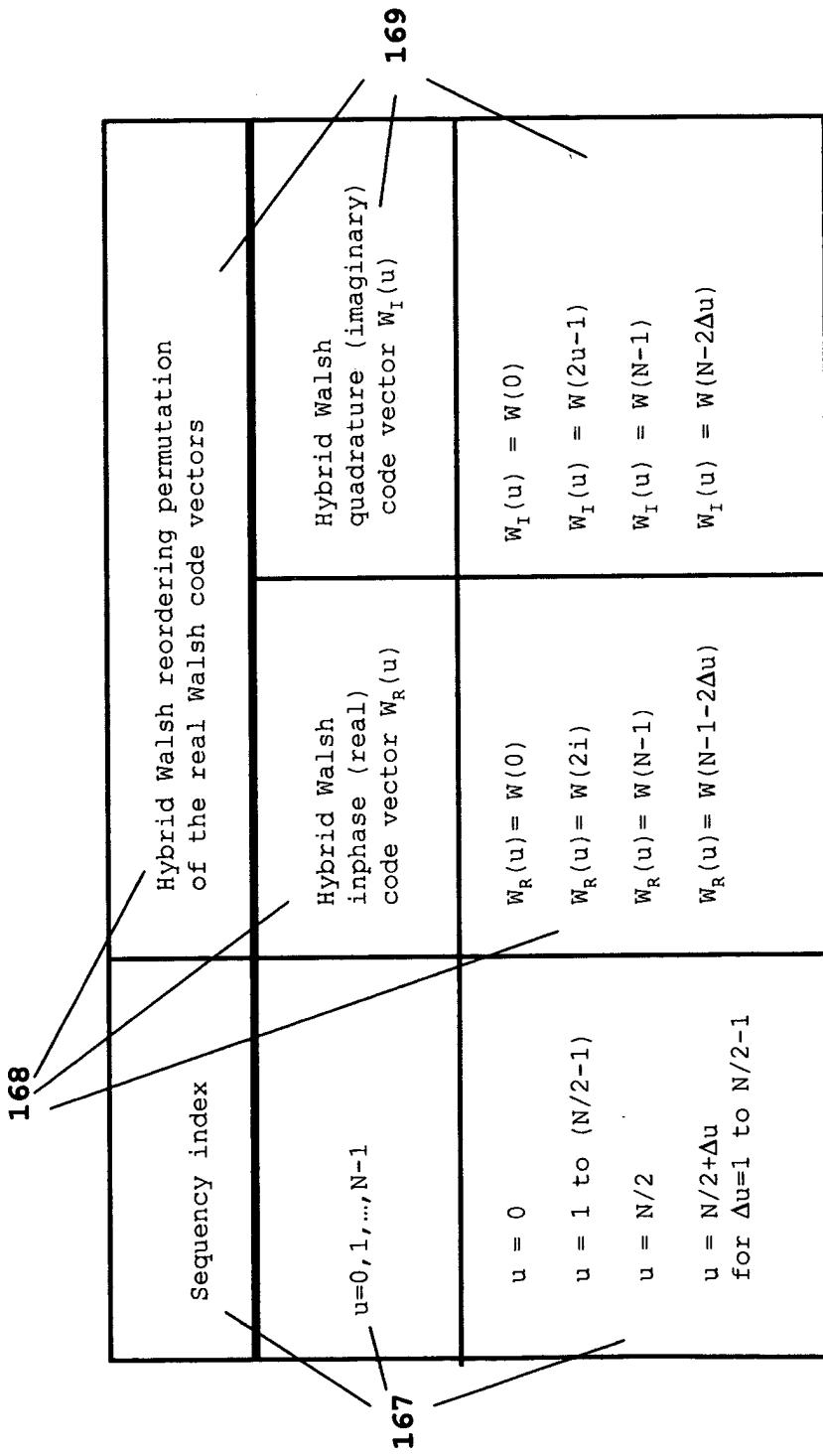
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**FIG. 5 Correlation of Fourier Codes  
with DFT Codes for N=32**



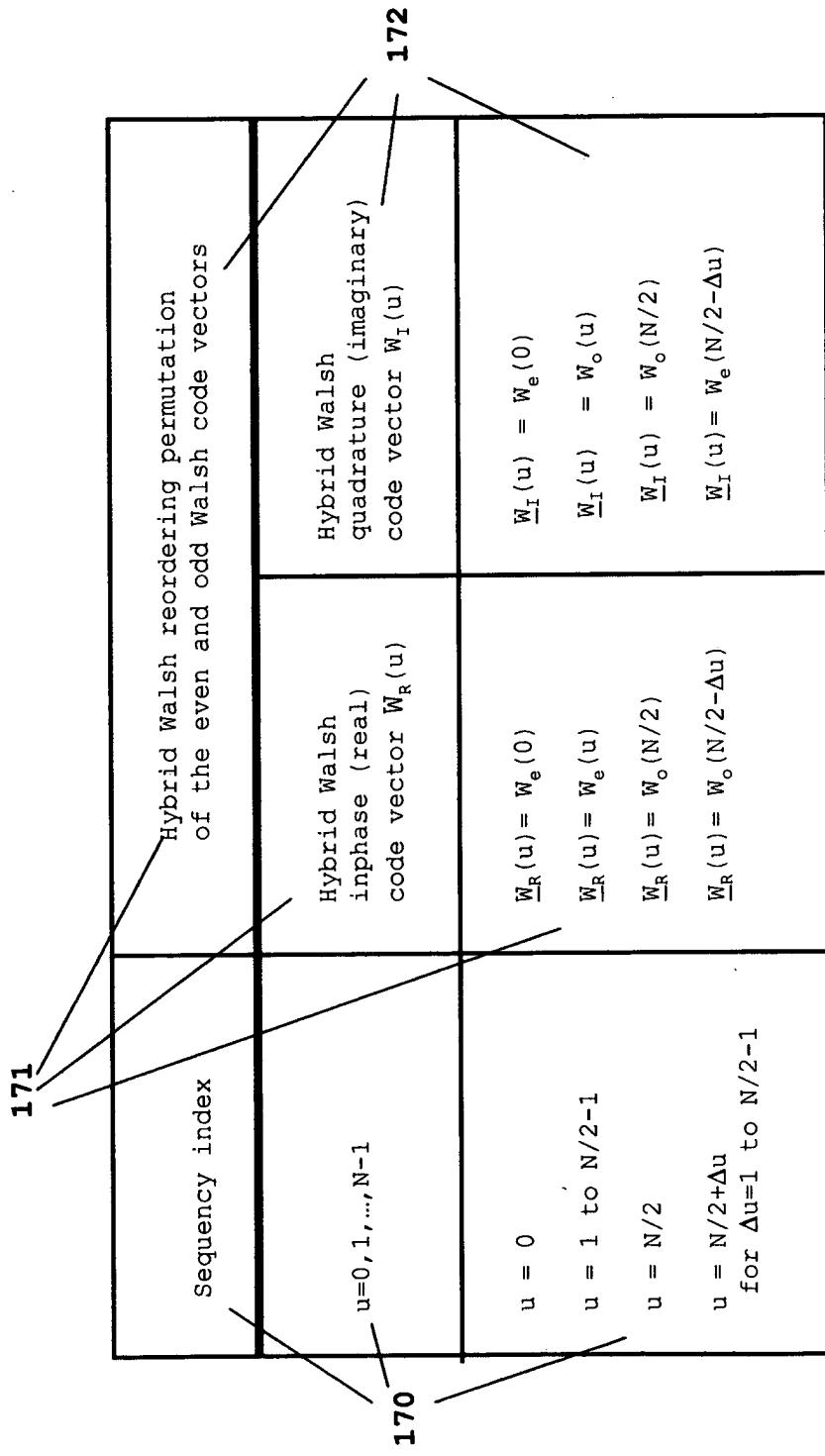
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**FIG. 5A Hybrid Walsh Implementation Algorithm**



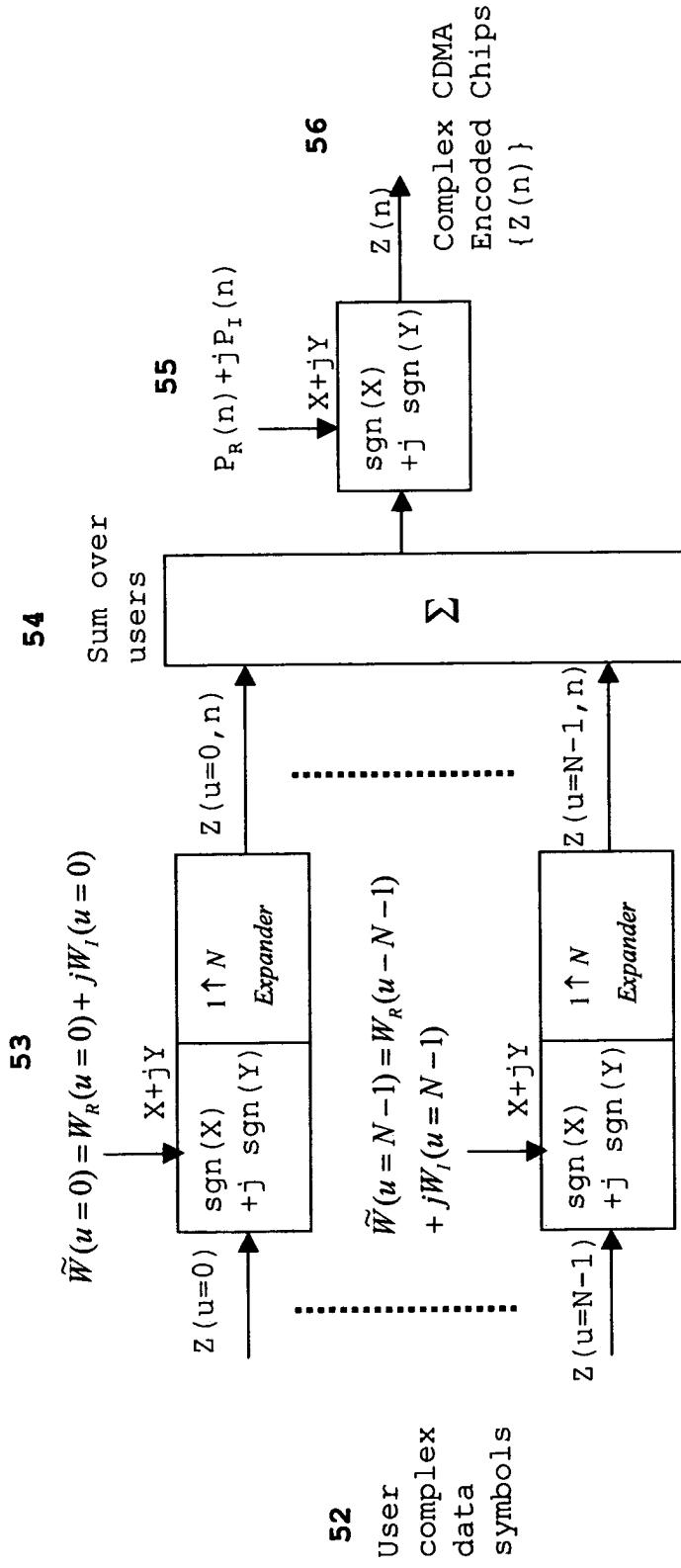
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**FIG. 5B Hybrid Walsh Implementation Algorithm**



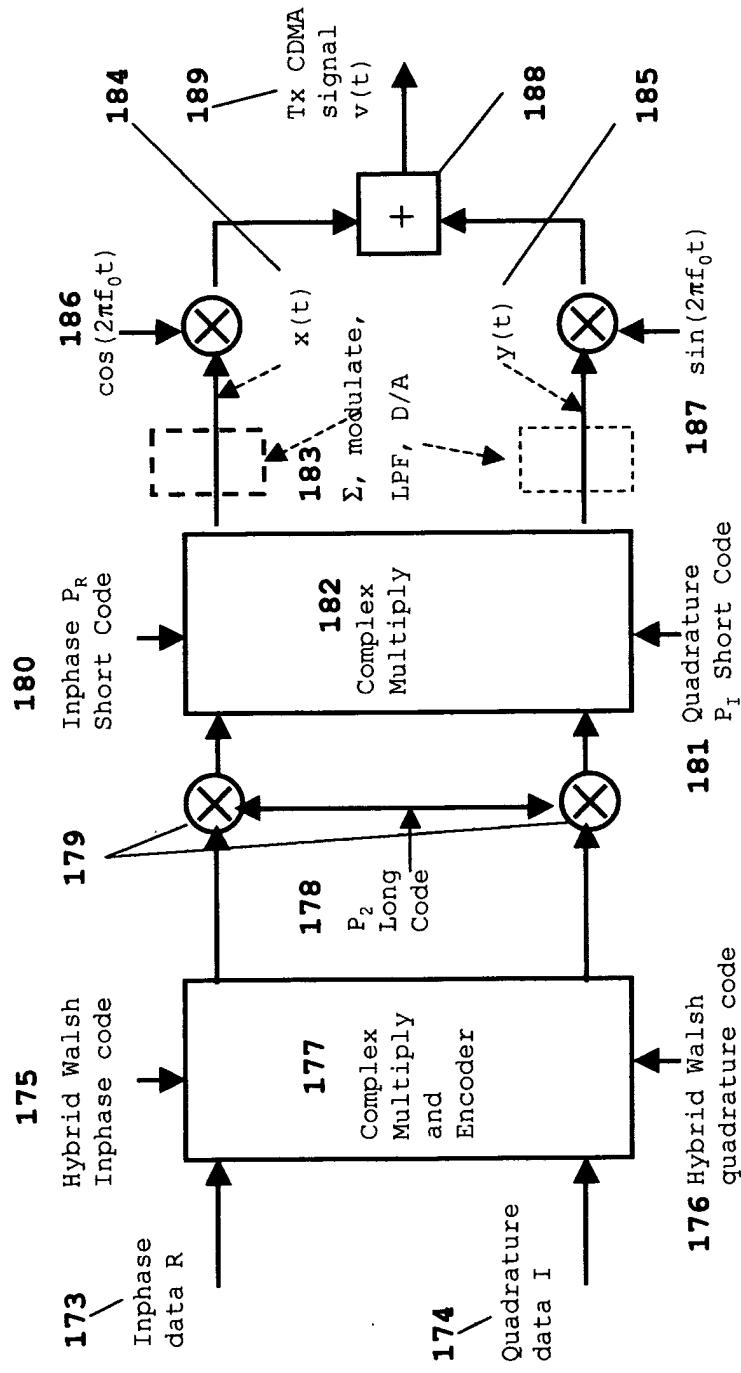
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**FIG. 6 Complex Walsh CDMA Encoding**



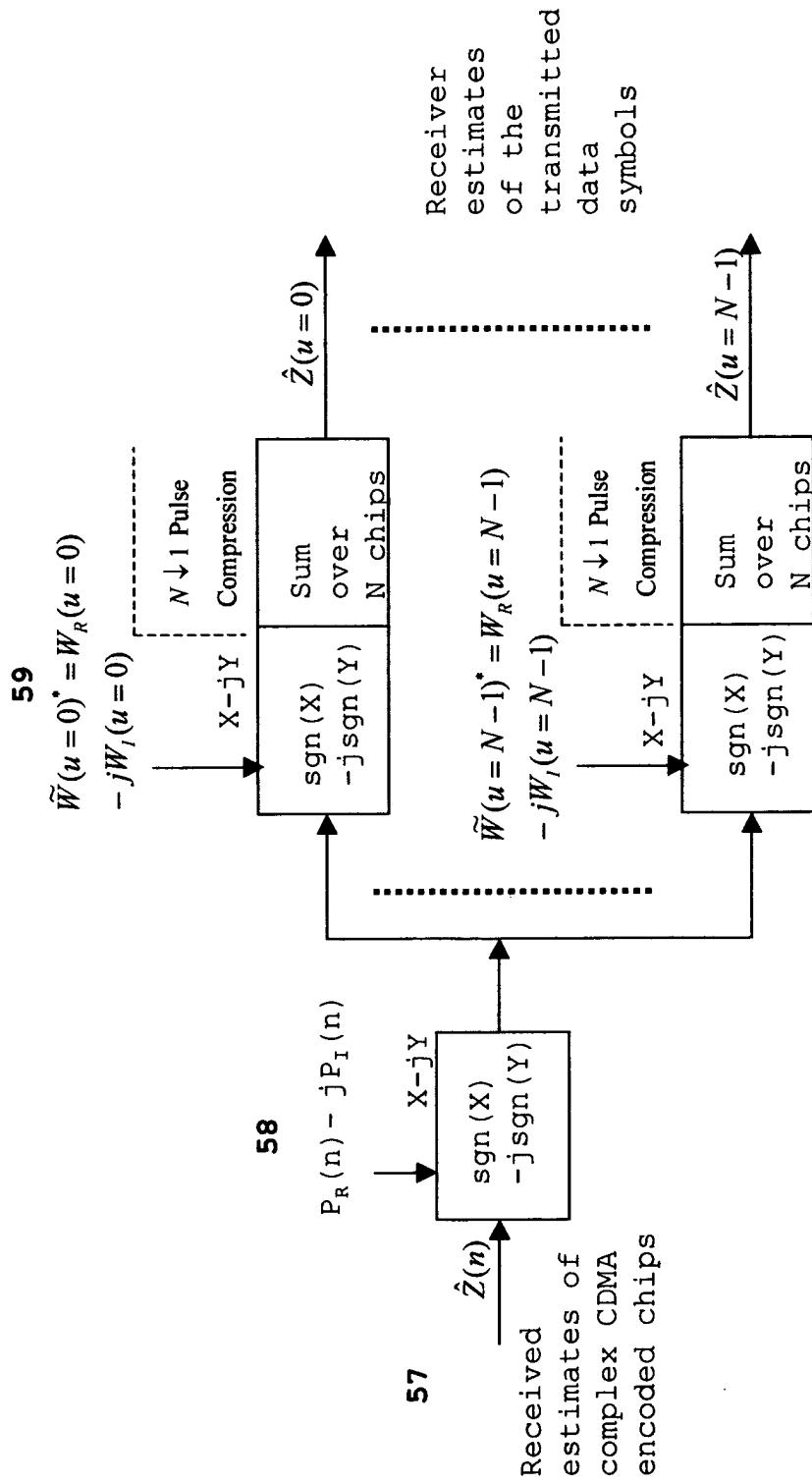
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**FIG. 6 Hybrid Walsh Transmit Signal Processing**



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**FIG. 7 Complex Walsh CDMA Decoding**



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**FIG. 7 Hybrid Walsh Receive Signal Processing**

